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Art. III.—*Victorian Tertiary Catenicellidae (Bryozoa), Part* III.

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Introduction.

This paper concludes a series of studies on the systematics of the Tertiary Catenicellidae (Stach, 1933, 1934, ii.), and deals principally with the genera of the sub-families Catenicellinae Stach, and Ditaxiporinae Stach (1935, ii.). When studying Lower Pliocene Bryozoa (Stach, 1935, i.), several species of Catenicellidae were added to the Tertiary fauna, including *Cornuticella perforata* (Busk, 1852), which constitutes the first definite record of the sub-family Cornuticellinae in Tertiary deposits.

In the sub-family Catenicellinae, one can correlate the ovicelligerous internodes with the far more numerous unovicelled zooecia, by using as a basis for comparison the daughter zooecium of the triglobulus, which is rarely affected by the development of the ovicell, and the daughter zooecium of a geminate pair.

A consideration of fossil Scuticellinid gonoecia, species incorrectly relegated to Catenicellidae and extra-Australian Tertiary species of Catenicellidae is appended.

Systematic Description.

Sub-family CATENICELLINAE Stach, 1935.

Genus **Pterocella** Levinsen, 1909.

Pterocella Levinsen, 1909, pp. 221, 246. Canu and Bassler, 1929, p. 441. Stach, 1935, ii., p. 392.

Type (by subsequent designation): *P.* (*Catenicella*) *alata* (Thomson, 1858).

Observations.—This genus is here restricted to those species with fenestrate sternal area, calcified suprascapular and infrascapular compartments and with the ovicell pertaining to the mother zooecium of a triglobulus.

Pterocella alata (Thomson, 1858).

Eunicea alata Desmarest et Lesueur MS., 1829, pl. v., fig. 5 (*vide* Pergens, 1887).

Catenicella alata Thomson, 1858, p. 137, pl. xiii., fig. 4; *idem.*, 1859, i., p. 80, pl. vi., fig. 4; *id.*, 1859, ii., p. 144. Macgillivray, 1879, dec. 3, p. 21, pl. xxiv., fig. 7. Waters, 1881, p. 317, pl. xvi., figs. 47, 49. 58; *id.*, 1882, p. 260; *id.*, 1883, p. 428, pl. xii., fig. 15; *id.*, 1887, p. 86, pl. iv., fig. 9. Pergens, 1887, p. 86. Jullien, 1888, pp. 275-278. Whitelegge, 1889, p. 283. Macgillivray, 1895, p. 11, pl. i., fig. 17. Harmer, 1902, p. 307, pl. xviii., fig. 53. Maplestone, 1904, p. 186.

Pterocella alata (Thomson), Levinsen, 1909, pp. 220, 246, pl. xii., figs. 6*a*, *b*, pl. xxi., fig. 4*a*. Canu and Bassler, 1929, p. 443, text fig. 176. Livingstone, 1929, p. 98. Stach, 1934, i., p. 17, text fig. 1; *idem*, 1935, i., p. 347.

Description.—See Levinsen (1909).

Dimensions.—Recent zooecium from Torquay (Vic.): length 0.53 mm., width 0.41; aperture, diameter 0.10. Fossil zooecium from Clifton Bank: length 0.51, width 0.40; aperture, diameter 0.10.

Distribution.—Recent: *vide* Stach, 1935, i., and add, Victoria: Bass Strait, Port Fairy (Waters); Sorrento (South Aust. Mus. coll.); Hobson's Bay (Aust. Mus. coll.); San Remo (Stach coll.). New South Wales: La Pérouse (Botany Bay) (Waters); Coogee, Bondi (Whitelegge). South Australia: Backstairs Passage (South Aust. Mus. coll.).

Fossil: *vide* Stach, 1935, i.

Observations.—Thomson (1858, pl. xiii., fig. 4) figures the more elongate zooecia found typically at base of secondary branches. Relation of length to width is variable in Recent zooecia, but some fossil zooecia of extreme dimensions may represent a distinct species. Waters' figured specimen (1883, pl. xii., fig. 16) belongs to *Carinatocella elongata* (Macgillivray, 1895).

PTEROCELLA HALLI (Maplestone, 1899).

Catenicella halli Maplestone, 1899, p. 7, pl. i., figs. 11, 11*a*; *idem*, 1904, p. 187.

C. acuminata idem, 1899, p. 7, pl. i., fig. 12; *id.*, 1904, p. 186.

Description.—Zooecium sub-ovate with spinous projection at each distal angle; length one and a half times greatest width, which occurs at level of scapular compartments. Straight entire proximal rim, in middle quarter of zooecium, at one-third of distance proximally from distal connecting-tube aperture to base; semicircular aperture extends half distance from proximal rim to distal connecting-tube aperture. Sternal area broad, longitudinally elliptical, extending one-half to two-thirds distance from proximal rim to proximal connecting-tube aperture; nine to eleven oval fenestrae. Scapular compartments, at middle level of aperture, face directly laterally; suprascapular compartments produced into spines projecting upward and outward, with small oval uncalcified areas facing forward; infrascapular compartments approximately equally developed. Dorsal surface smooth, moderately convex in axial region. Axis of daughter zooecium inclined about 60 deg. to that of mother zooecium. Ovicell not observed.

Dimensions.—Zooecium from Mitchell River (Bairnsdale): length 0.50 mm., width 0.29; aperture, diameter 0.09.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: No. 7 bore (Parish of Glencoe) at 580 ft.

Observations.—Readily distinguished from *P. alata* (Thomson, 1858) by spinous projections from suprascapular compartments and larger number of fenestrae on sternal area. Maplestone's "*Catenicella*" *acuminata* agrees with *P. halli* in essential characters, his distinctions being due to slight fracture of one specimen, and normal variation in the other.

Genus **Carinatocella** Stach, 1935.

Carinatocella Stach, 1935, ii., pp. 389, 393.

Type (by original designation): *Carinatocella harmeri* Stach, 1935.

Carinatocella elongata (Macgillivray, 1895).

Catenicella alata Waters (*non* Thomson, 1858), 1883, pl. xii., fig. 16.

C. elongata Macgillivray, 1895, p. 11, pl. i., fig. 16. Maplestone, 1904, p. 187.

C. crux Macgillivray, 1895, p. 12, pl i., fig. 18. Maplestone, 1904, p. 187.

C. porosa Macgillivray, 1895, p. 12, pl. i., fig. 19. Maplestone, 1904, p. 188.

Description.—Zooecium elongate-pyriform, length at least twice greatest width which occurs at level of scapular compartments. Slightly concave, entire proximal rim of aperture is in middle third of zooecium two-fifths of distance proximally from distal connecting-tube aperture; aperture extends one-third to one-half distance from proximal rim to distal connecting-tube aperture; lateral margins with a pair of cardelles close to proximal rim. Sternal area short, sub-circular, extending one-third distance from proximal rim to proximal connecting-tube aperture; five to seven oval fenestrae. Transversely-elongate scapular compartments, at middle level of aperture, open directly laterally; large suprascapular compartments face almost directly forward, with frontal surface uncalcified; distal infrascapular compartments scarcely extend proximally beyond proximal rim; inner margins of broad, long proximal infrascapular compartments meet below sternal area in longitudinal grooved ridge extending to proximal connecting-tube aperture. Dorsal surface smooth, strongly convex in axial region. Axis of daughter zooecium inclined about 65 deg. to that of mother zooecium. Ovicell large, punctured by numerous small pores, transversely oval and bordered by a smooth ridge.

Dimensions.—Zooecium from Clifton Bank: length 0.52 mm., width 0.24; aperture, diameter 0.08.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: Flinders, Dartmoor (at foot of railway bridge over Glenelg River), Altona Bay coal shaft, Batesford tunnel marl dump, No. 6 bore (Parish of Mooroodue) at 4-6 ft., Hamilton bore at 80-85 ft., No. 7 bore (Parish of Glencoe) at 705, 725, 985 ft.

Upper Oligocene: No. 7 bore (Parish of Glencoe) at 1,270 ft.

Observations.—Differs from *Carinatocella harmeri* Stach, 1935, in its more elongate zooecium, forwardly-directed scapular compartments and great development of proximal infrascapular compartments. Waters' figured specimen (1883, pl. xii., fig. 16) belongs here. From comparison of figured specimens, "*Catenicella*" *cruxr* Macgillivray, 1895, represents a perfectly preserved single zooecium of this species with no essential difference from the damaged geminate pair figured as "*Catenicella*" *elongata* by Macgillivray.

"*Catenicella*" *porosa* is a triglobulus from the left side of which the daughter zooecium has become detached. It is correlated with this species since it is not a triglobulus of *Pterocella alata* (Thomson, 1858) or *Carinatocella elegantissima* (Maplestone, 1898) and also since it was recorded from Clifton Bank where *C. elongata* is very common.

CARINATOCELLA FLEXUOSA (Waters, 1881).

Catenicella flexuosa Waters, 1881, p. 317, pl. xvi., fig. 39.
C. elegantissima Maplestone, 1898 (*non* Maplestone, 1911), p. 16, pl. i., fig. 6; *idem*, 1904, p. 187.
C. morningtoniensis Maplestone, 1911, p. 267, pl. xxxvii., fig. 4.

Description.—Zooecium elongate-elliptical with slight projections from suprascapular compartments; length almost twice greatest width at level of scapular compartments. Slightly concave proximal rim, in middle quarter of zooecium, at two-fifths of distance proximally from distal connecting-tube aperture to base; semicircular aperture extends less than half distance from proximal rim to distal connecting-tube aperture. Sternal area narrow, elongate, semi-elliptical, extending two-thirds distance from proximal rim to proximal connecting-tube aperture; eight to thirteen pyriform fenestrae. Scapular compartments, at level of aperture, open directly laterally; suprascapular compartments broad, passing into triangular projections at upper and outer angles; proximal and distal infrascapular compartments about equally developed. Dorsal surface moderately convex in axial region. Axis of daughter zooecium inclined about 45 deg. to that of mother zooecium. Ovicell subcircular, with two oval depressed areas separated by median longitudinal band.

Dimensions.—Zooecium from 705 ft., No. 7 bore, Parish of Glencoe: length 0.56 mm., width 0.31; aperture, diameter 0.09.

Distribution.—Middle Miocene: No. 7 bore (Parish of Glencoe) at 236-286 ft. and 330 ft.

Lower Miocene: *vide* Maplestone (1904) and add: Clifton Bank (Muddy Creek, Hamilton), Mitchell River at Bairnsdale, Knight's bore (Dartmoor), No. 6 bore (Parish of Moorooduc) at 4-6 ft., No. 7 bore (Parish of Glencoe) at 580, 705, 790 ft.

Upper Oligocene: No. 7 bore (Parish of Glencoe) at 1,270 ft.

Observations.—Characterised by large number of fenestrae in sternal area, and projection of suprascapular compartments. Waters' damaged specimen (1881) is regarded as conspecific with "*Catenicella*" *morningtoniensis* Maplestone, the description being based on the latter plesiotype. The "wavy thick tube on the front" (Waters) appears to belong to some other organism which has subsequently encrusted frontal surface of geminate pair.

Maplestone's triglobulus (1898) is correlated with "*Catenicella*" *morningtoniensis* Maplestone, 1911, on characters of the daughter zooecium which, in the triglobulus, shows reduced number (six) of fenestrae; both were found at Balcombe Bay. The ovicell, with a longitudinal median band, resembles that of *Carinatocella harmeri* Stach, 1935, but the latter differs in the less number of fenestrae in daughter zooecium. Maplestone (1911, p. 267) described a terminal gonoecium under the same trivial name attached to present species.

Genus **Claviporella** Macgillivray, 1887.

Claviporella Macgillivray, 1887, i., p. 65; *idem*, 1887, ii., p. 198; *id.*, 1895, p. 20. Levinsen, 1909, pp. 220, 242. Canu and Bassler, 1929, p. 444. Stach, 1935, ii., p. 390.

Type (by subsequent designation): *C.* (*Catenicella*) *geminata* (Thomson, 1858).

Observations.—Ovicell pertains to mother zooecium of a triglobulus; deep sinus in proximal rim of aperture. Usually a more or less well-developed cribriform area occurs proximal to the aperture.

Claviporella longicollis (Waters, 1883).

Catenicella longicollis Waters, 1883, p. 432, pl. xii., figs. 2–4.

Claviporella longicollis (Waters), Macgillivray, 1895, p. 21, pl. ii., figs. 23–25. Maplestone, 1898, p. 19, pl. ii., fig. 14; *idem*, 1904, p. 190.

Description.—Zooecium triangular; greatest width, at upper level of scapular compartments, almost equals length. Proximal rim, with deep sinus, situated in middle quarter of zooecium less than one-third distance proximally from distal connecting-tube aperture to base; lateral and distal margins of aperture form an arc greater than a semicircle, extending two-thirds of distance from proximal rim to distal connecting-tube aperture. Sternal area longitudinally-elliptical, cribriform, extending more than half distance from proximal rim to proximal connecting-tube aperture. Scapular compartments, extending above and below level of aperture, face directly laterally; suprascapular compartments small, calcified; proximal and distal infrascapular compartments heavily calcified, of small extent. Dorsal surface

moderately convex, flattened at distal angles. Axis of daughter zooecium inclined at about 35 deg. to that of mother zooecium. Ovicell globular, tuberculate and perforate.

Dimensions.—Zooecium from Clifton Bank (Muddy Creek, Hamilton) : length 0.43 mm., width 0.39; aperture, diameter 0.08.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: Flinders, Batesford tunnel marl dump, Forsyth's (Grange Burn, Hamilton) below remanié nodule bed, No. 7 bore (Parish of Glencoe) at 650 ft.

Observations.—Characterized by broad zooecia, tuberculate character of ovicell and large cribriform area on frontal. Levinsen (1909) suggested that this species should be included in *Costicella* (=*Costaticella* Maplestone, 1899), but character of ovicell places it in Catenicellinae. The suggestion seems due to the form of the cribriform sternal area, which, however, does not appear to be homologous with that of *Costaticella*.

Claviporella angusta Macgillivray, 1895.

Claviporella longicollis var. *angusta* Macgillivray, 1895, p. 21, pl. ii., figs. 23, 23*a*.

C. angusta Macgillivray, Maplestone, 1898, p. 19, pl. ii., fig. 15; *idem*, 1904, p. 190.

Description.—Zooecium elongate-oval; greatest width, at level of scapular compartments, equals about half length. Deeply sinuate proximal rim, in middle third of zooecium, at one-third of distance proximally from distal connecting-tube aperture to base; lateral and distal margins of aperture, forming arc greater than a semicircle, extend two-thirds of distance from proximal rim to distal connecting-tube aperture. The elongate-elliptical cribriform area extends more than half distance from proximal rim to proximal connecting-tube aperture. Scapular compartments, not extending beyond level of aperture, face directly laterally; suprascapular compartments calcified, of small extent; proximal infrascapular compartments greater in extent than distal infrascapular compartments. Dorsal surface moderately convex, depressed behind distal compartments. Axis of daughter zooecium inclined about 65 deg. to that of mother zooecium. Ovicell globular, smooth and imperforate.

Dimensions.—Zooecium from No. 6 bore, Parish of Moorooduc at 4-6 ft.: length 0.60 mm., width 0.33; aperture, diameter 0.08.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: No. 7 bore (Parish of Glencoe) at 660 ft., No. 6 bore (Parish of Moorooduc) at 4-6 ft.

Observations.—Distinguished from *C. longicollis* (Waters) by more slender zooecia and smooth imperforate ovicell; much rarer than preceding species.

CLAVIPORELLA OBLIQUA Macgillivray, 1895.

Claviporella obliqua Macgillivray, 1895, p. 21, pl. ii., fig. 26. Maplestone, 1904, p. 190.

Description.—Zooecium elongate-triangular; greatest width, at upper level of scapular compartments, equals about two-thirds length. Deeply sinuate proximal rim, in middle third of zooecium, at less than one-third distance from distal connecting-tube aperture to base; height of aperture equals two-thirds distance from proximal rim to distal connecting-tube aperture. Four to six pores, arranged in a semicircle, perforate frontal below proximal rim. Scapular compartments, at level of aperture, of small extent; suprascapular compartments short, calcified; proximal infrascapular compartment of greater extent than distal infrascapular compartment. Dorsal surface moderately convex, depressed at distal angles. Axis of daughter zooecium inclined about 30 deg. to that of mother zooecium. Ovicell not known.

Dimensions.—Zooecium from Clifton Bank (Muddy Creek, Hamilton): length 0.48 mm., width 0.30; aperture, diameter 0.08.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: Clifton Bank (Muddy Creek, Hamilton), Batesford tunnel marl dump.

Observations.—Characterized by lack of cribriform area and presence of small pores on frontal.

CLAVIPORELLA MARIONAE Macgillivray, 1895.

Claviporella marionae Macgillivray, 1895, p. 21, pl. ii., figs. 27, 28. Maplestone, 1904, p. 190.

Description.—Zooecium triangular; greatest width, at upper level of scapular compartments, about one half length. Deeply sinuate proximal rim, in middle third of zooecium, at about one-third distance from distal connecting-tube aperture to base; height of aperture exceeds two-thirds distance from proximal rim to distal connecting-tube aperture. Sternal area lacks ornament. Scapular compartments, at level of aperture, lodge moderately large avicularia facing directly laterally; suprascapular compartments calcified, of small extent; proximal infrascapular compartments of greater extent than distal infrascapular compartments, both face laterally. Dorsal surface moderately convex, distal half of lateral margins depressed. Axis of daughter zooecium inclined about 45 deg. to that of mother zooecium. Ovicell not known.

Dimensions.—Zooecium from Clifton Bank (Muddy Creek, Hamilton): length 0.57 mm., width 0.29; aperture, diameter 0.08.

Distribution.—Lower Miocene: *vide* Maplestone (1904).

Observations.—Characterized by lack of sternal structures, and the unusually large projection of the distal connecting-tube apertures.

CLAVIPORELLA AIRENSIS Maplestone, 1911.

Claviporella airensis Maplestone, 1911, p. 270, pl. xxxviii., fig. 12.

Description.—Zooecium subovate; greatest width, at level of scapular compartments, about two-thirds length of zooecium. Deeply sinuate proximal rim, in middle quarter of zooecium, at about one-third distance from distal connecting-tube aperture to base. Height of aperture about half distance from proximal rim to distal connecting-tube aperture. A narrow, longitudinally-elongate pore occurs about half way between proximal rim and proximal connecting-tube aperture. Scapular compartments, at level of aperture, directed laterally; suprascapular compartments not preserved; proximal infrascapular compartment of greater extent than distal infrascapular compartment, both face laterally. Dorsal surface moderately convex. Axis of daughter zooecium inclined about 55 deg. to that of mother zooecium. Ovicell globular, slightly papillose, imperforate.

Dimensions.—Calculated from mother zooecium of holotype triglobulus: length 0.39 mm., width 0.24; aperture, diameter 0.08.

Distribution.—?Lower Miocene: Aire coastal beds (Maplestone).

Observations.—Characterized by small size of median elongate pore in sternal area, which has probably been formed by fracture of a cribriform area. The ovicell is also distinctive. The holotype is the sole specimen known.

Genus **Strongylopora** Maplestone, 1899.

Strongylopora Maplestone, 1899, p. 4. Canu and Bassler, 1929, p. 441. Stach, 1935, ii., p. 392.

Hincksiella Levinsen, 1909, pp. 221, 241.

Type (by subsequent designation): *S.* (*Catenicella*) *pulchella* (Maplestone, 1880).

Observations.—Characterized by sub-marginal row of large pores and completely calcified suprascapular compartments. Cleared balsam preparations show that the scapular compartments extend from level of aperture to proximal connecting-tube aperture. Infrascapular compartments are therefore absent, but probably represented by the sub-marginal row of pores.

STRONGYLOPORA PULCHELLA (Maplestone, 1880).

Catenicella pulchella Maplestone, 1880, p. 64, pl. v., fig. 4. Macgillivray, 1884, dec. ix., p 31, pl. lxxxix., fig. 4. Busk, 1884, p. 13, pl. i., fig. 4. Macgillivray, 1895, p. 11, pl. i., fig. 15.

C. concinna Macgillivray, 1881, p. 84, pl. i., figs. 1, 1a.

Strongylopora pulchella (Maplestone), 1899, p. 4; *idem,* 1904, p. 190. Canu and Bassler, 1929, p. 441, text fig. 177.

S. complanata Maplestone, 1899, p. 4, pl. i., fig. 6.

S. nitida idem, 1899, p. 5, pl. i., fig 7.

S. ampullacea idem, 1899, p. 5, pl. i., fig. 8.

Hincksiella pulchella (Maplestone), Levinsen, 1909, p. 241, pl. xii., figs. 9 *a-c.*

Description.—Zooecium semi-elliptical; greatest width, at distal limit of scapular compartments, about three-quarters length. Broadly sinuate proximal rim, in middle third of zooecium, at one-third distance from distal connecting-tube aperture to base; aperture extends two-thirds distance from proximal rim to distal connecting-tube aperture; lateral margins curve inward. Sternal area with sub-marginal row of eleven to fifteen large pores. Scapular compartments, with avicularia opening laterally at level of proximal half of aperture, extend to base of zooecium; suprascapular compartments triangular, outer distal angles extending above level of distal connecting tube aperture. Dorsal surface slightly convex, depressed along margins and behind distal angles of zooecium. Axis of daughter zooecium inclined about 45 deg. to that of mother zooecium. Ovicell slightly convex, with about eight irregularly arranged large perforations.

Dimensions.—Recent zooecium from Port Phillip Heads: length: 0.49 mm., width 0.38; aperture, diameter 0.10.

Distribution.—Recent: Victoria: Queenscliff, Port Phillip Heads (Macgillivray). South Australia: Backstairs Passage (South Aus. Mus. coll.). New South Wales: $2\frac{1}{2}$ to $3\frac{1}{2}$ miles S. by W. off Port Jackson at 36 to 39 fathoms ("Thetis" Exped.) (Aust. Mus. coll.).

Lower Miocene: *vide* Maplestone (1904).

Observations.—Characterized by broad sinus in proximal rim, eleven to fifteen sub-marginal pores, shape of zooecium and the numerous pores in ovicell. *S. complanata*, *S. nitida* and *S. ampullacea* (Maplestone, 1899) are included here because of their shape and the number of sub-marginal pores present. The broad sinus is not seen in the proximal rim of the last-named form, which appears to have been fractured.

Strongylopora expansa (Macgillivray, 1895).

Catenicella expansa Macgillivray, 1895, p. 10, pl. i., figs. 8, 9.
Strongylopora expansa (Macgillivray), Maplestone, 1899, p. 4; *idem*, 1904, p. 189.
S. concinna idem, 1913, p. 353, pl. xxvii., fig. 1.

Description.—Zooecium broadly ovate; greatest width, at distal end of scapular compartments, approximates length. Slightly convex proximal rim, in middle third of zooecium, at one-third distance from distal connecting-tube aperture to base. Transverse ascopore developed in median position below proximal rim; height of aperture about three-quarters distance from proximal rim to distal connecting-tube aperture. Sternal area with six to nine large, circular, sub-marginal pores. Scapular compartments, with avicularia directed laterally at level of aperture, extend to base; large triangular suprascapular compartments

extend well above level of distal connecting-tube aperture. Dorsal surface moderately convex, depressed at margins and distal quarter of zooecium. Axis of daughter zooecium inclined about 70 deg. to that of mother zooecium. Ovicell large, with median longitudinal ridge and perforation on each side.

Dimensions.—Zooecium from Clifton Bank (Muddy Creek, Hamilton): length 0.37 mm., width 0.41; aperture, diameter 0.08.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: Flinders, Forsyth's (Grange Burn, Hamilton) below remanié nodule bed, No. 6 bore (Parish of Moorooduc) at 4-6 feet.

Observations.—Characterized by broad zooecia and six to nine sub-marginal pores. In most specimens, suprascapular and scapular compartments are fractured causing zooecia to appear more slender. Maplestone's triglobulus (*S. concinna*) is correlated with this species because of small number of submarginal pores present on daughter zooecium; proximal rims are all fractured and thus presence of ascopore could not be determined.

STRONGYLOPORA MAMILLATA (Macgillivray, 1895).

Catenicella mamillata Macgillivray, 1895, p 10, pl. i., figs. 10, 11.

Strongylopora mamillata (Macgillivray), Maplestone, 1899, p. 4; *idem*, 1904, p. 189.

Description.—Zooecium elongate-elliptical; greatest width, at level of avicularia, about half length. Slightly convex proximal rim, in middle third of zooecium, at one-third distance from distal connecting-tube aperture to base; transverse ascopore in median position just below proximal rim; height of aperture one-half to two-thirds distance from proximal rim to distal connecting-tube aperture. Sternal area with sub-marginal row of twelve to fifteen subcircular pores; median portion of sternal area very strongly convex. Scapular compartments, with avicularia directed laterally at level of aperture, extend proximally to base of zooecium; suprascapular compartments triangular, projecting slightly above level of distal connecting-tube aperture. Dorsal surface moderately convex in axial region, depressed along lateral margins and behind suprascapular compartments. Axis of daughter zooecium inclined about 70 deg. to that of mother zooecium. Ovicell not known.

Dimensions.—Zooecium from Batesford tunnel marl dump: length 0.57 mm., width 0.32; aperture, diameter 0.11.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: Flinders, Batesford tunnel marl dump, Forsyth's (Grange Burn, Hamilton) below remanié nodule bed, Hamilton bore at 80-85 feet.

Observations.—Characterized by elongate zooecium, transverse ascopore and twelve to fifteen sub-marginal pores. Closely allied to *Strongylopora expansa* (Macgillivray), but zooecium is more slender and there is a greater number of sub-marginal pores in the present species.

STRONGYLOPORA CIRCUMCINCTA (Waters, 1883).

Catenicella circumcincta Waters, 1883, p. 432. Macgillivray, 1895, p. 9, pl. i., fig. 7.
Strongylopora circumcincta (Waters), Maplestone, 1899, p. 4; *idem*, 1904, p. 189.

Description.—Zooecium elongate-semielliptical; greatest width, at distal limit of scapular compartments, about half length. Slightly convex proximal rim, in middle third of zooecium, at one-quarter of distance from distal connecting-tube aperture to base; narrow slit leads down from centre of proximal rim to transverse ascopore; height of aperture equals two-thirds distance from proximal rim to distal connecting-tube aperture. Sternal area with submarginal row of about twelve large oval pores. Scapular compartments, with avicularia directed laterally at level of aperture, extend to base; triangular suprascapular compartments extend well above level of distal connecting-tube aperture. Dorsal surface moderately convex, depressed behind distal angles. Ovicell not known.

Dimensions.—Zooecium from Clifton Bank (Muddy Creek, Hamilton): length 0.53 mm., width 0.26; aperture, diameter 0.08.

Distribution.—Lower Miocene: *vide* Maplestone (1904).

Observations.—Above description is based on Macgillivray's plesiotype, the holotype being inaccessible. Waters' description, without any figure (1883), makes it uncertain whether Macgillivray's plesiotype is really "*Catenicella*" *circumcincta* Waters.

STRONGYLOPORA TENUIS (Macgillivray, 1895).

(Text-fig 1.)

Catenicella tenuis Macgillivray, 1895, p. 10, pl. i., figs. 12-14.
Strongylopora tenuis (Macgillivray), Maplestone, 1899, p. 4; *idem*, 1904, p. 190.
S. cuneiformis idem, 1899, p. 5, pl. i, fig. 9; *id.*, 1904, p. 189.

Description.—Zooecium elongate-semielliptical; greatest width, at level of avicularia, about half length. Slightly concave proximal rim, in middle third of zooecium, at one-quarter of distance from distal connecting-tube aperture to base; height of aperture equals half distance from proximal rim to distal connecting-tube aperture. Sternal area slightly convex, with sub-marginal row of ten to twelve oval pores. Scapular compartments, with avicularia directed laterally at level of aperture, extend to base of zooecium; suprascapular compartments triangular, acute, extending far above level of distal connecting-tube aperture. Dorsal surface moderately convex, depressed

behind suprascapular compartments. Axis of daughter zooecium inclined about 45 deg. to that of mother zooecium. Ovicell subcircular, globular with transversely elliptical depression constricted parallel to longitudinal axis of distal zooecium.

Dimensions.—Zooecium from No. 7 bore, Parish of Glencoe, at 790 feet: length 0.50 mm., width 0.28; aperture, diameter 0.09.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: Flinders, Prowse's marl pit (2 miles W. of Mt. Moriac), No. 7 bore (Parish of Glencoe) at 790 feet.

Observations.—Characterized by absence of ascopore and of sinus in proximal rim. Maplestone's *Strongylopora cuneiformis* represents a perfectly preserved specimen of this species and shows acute nature of suprascapular compartments and their extension above level of distal connecting-tube aperture. A triglobulus of this species was found at 790 feet in No. 7 bore, Parish of Glencoe. Characters of ovicell are quite distinct from those of other species. The daughter zooecium has become detached and basis of correlation with present species is character of aperture of distal zooecium and shape and number of sub-marginal pores in proximal zooecium.

Genus **Stenostomaria** Macgillivray, 1895.

Stenostomaria Macgillivray, 1895, p. 16. Canu and Bassler, 1927, p. 21 (sub-genus of *Strophipora* MacG.); *idem*, 1929, p. 453 (sub-genus of *Strophipora* MacG.). Stach, 1934, ii., p 43; *idem*, 1935, ii., p. 392.

Observations.—The author (1934, ii., p. 43) has shown that the ovicell pertains to the mother zooecium of a triglobulus, thus separating it from the Scuticellinid genus *Strophipora* MacG.

Characterized by encroachment of infrascapular compartments on frontal, sternal area being represented by longitudinal median ridge formed by union of inner margins of infrascapular compartments. The lateral compartments developed on the frontal below the scapular compartments, probably represent the distal infrascapular compartments of other genera, those on the dorsal surface corresponding to the proximal infrascapular compartments.

Stenostomaria solida (Waters, 1881).

Catenicella solida Waters, 1881, p. 318, pl. xvi., figs. 37, 38; *idem*, 1883, p. 430.

Stenostomaria solida (Waters). Macgillivray, 1895, p. 17, pl. ii., figs. 7, 8. Maplestone, 1899, p. 1, pl. i., figs. 1, 1a; *idem*, 1904, p. 188.

Strophipora bellis Maplestone, 1898, p. 18, pl. ii., fig. 16.

Description. — Zooecium elongate-subrectangular; greatest width, at level of proximal rim of aperture, about half length. Proximal rim, at one-quarter of distance from distal connecting-tube aperture to base, with length one-third width of zooecium,

slightly concave and with deep constricted sinus; height of aperture two-thirds of distance from proximal rim to distal connecting-tube aperture. Sternal area represented by median longitudinal grooved ridge extending from below sinus of aperture to proximal connecting-tube aperture. Scapular compartments developed as short protuberances above and to each side of aperture, bordered by bounding ridges of suprascapular and distal infrascapular compartments; suprascapular compartments uncalcified, extending from proximal rim to distal connecting-tube aperture, bounded laterally by scapular compartments; distal infrascapular compartments occupy entire area of frontal below level of proximal rim, communicate with zooecium by six to eight septula; proximal infrascapular compartments occupy entire dorsal surface of zooecium, their inner margins fusing to form longitudinal median grooved ridge; they communicate with zooecium by six to eight septula. Dorsal surface strongly convex in centre of zooecium. Axis of daughter zooecium inclined about 45 deg. to that of mother zooecium. Ovicell bordered by thick transversely-rectangular salient ridge beginning on each side of proximal rim of distal zooecium, terminating at distal rim of proximal zooecium; enclosed area is slightly convex and punctate; aperture of proximal zooecium broader than that of normal zooecium.

Dimensions.—Zooecium from No. 6 bore, Parish of Mooroodue, at 4-6 feet: length 0.75 mm., width 0.41; aperture, diameter 0.12.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: Dartmoor (at foot of railway bridge over Glenelg River), Knight's bore (Dartmoor), Beach Cliff at Ocean Grove (Bellarine Peninsula), Batesford Quarry, Batesford tunnel marl dump, Hamilton bore at 80-85 feet, No. 6 bore (Parish of Mooroodue) at 4-6 feet, No. 7 bore (Parish of Glencoe) at 650, 660, 705, 725, 790 feet.

Upper Oligocene: No. 7 bore (Parish of Glencoe) at 1,270 feet.

Observations.—The sole species of *Stenostomaria* links the essentially unizooecial internodes of the vast majority of Catenicellidae with the multizooecial internodes of Ditaxiporinae, whose zooecial morphology shows distinct relationships to this widespread form which is not recorded later than Lower Miocene.

Comparison of daughter zooecium of the triglobulus figured by Maplestone (1898) as *Strophipora bellis* with normal zooecia of *S. solida* shows that the two forms are conspecific. It is remarkable that Maplestone did not note this when, in the following year, he identified a fragment of the triglobulus, showing only the rectangular ovicell and distal zooecium, with this species.

Sub-family DITAXIPORINAE Stach, 1935.

Genus **Ditaxipora** Macgillivray, 1895.

Ditaxipora Macgillivray, 1895, p. 22. Levinsen, 1909, p. 259. Canu and Bassler, 1927, p. 21 (sub-genus of *Strophipora* MacG.); *idem*, 1929, p. 453 (sub-genus of *Strophipora* MacG.). Stach, 1934, ii., p. 44; *idem*, 1935, ii., pp. 391, 394.

Type (by Monotypy): *D.* (*Catenicella*) *internodia* (Waters, 1881).

Description.—Zoarium articulated; internodes of numerous zooecia (usually eight). Longitudinal media raised band extends from base of zooecium to proximal rim of aperture where it extends on either side to avicularium or to adzooecial bounding ridge. Avicularia occur only on abzooecial side of zooecia. Dorsal surface with depression surrounded by raised border. Ovicell deeply immersed in distal zooecium.

Observations.—Relationship of depressions on zooecia of this genus to lateral compartments of Recent Catenicellidae is not difficult to establish. As in *Stenostomaria*, the frontal depressions correspond to distal infrascapular compartments. The dorsal depression is regarded as homologous with one of the proximal infrascapular compartments, while the adzooecial lateral wall represents the remaining infrascapular compartment. *Catenicella continua* Waters, 1891, from the Priabonian (Lower Oligocene) of Monteechio Maggiore and Brendola (Italy) belongs here.

Ditaxipora internodia (Waters, 1881).

(Text-figs. 2, 3.)

Catenicella internodia Waters, 1881, p. 318, pl. xviii., figs. 78, 79; *idem*, 1883, p. 430.

C. internodia var. *angustata* Waters, 1883, p. 430.

Ditaxipora internodia (Waters), Macgillivray, 1895, p. 22, pl. ii., fig. 31. Maplestone, 1898, p. 21; *idem*, 1904, p. 191.

Strophipora (*Ditaxipora*) *internodia* (Waters), Canu and Bassler, 1929, p. 452, text figs. 185 F, G.

Description.—Zooecium sub-rectangular, distal abzooecial angle projecting outward; greatest width, at level of avicularium, about half length. Concave proximal rim, in middle third of zooecium, at one-third of distance from distal end to base; height of aperture about two-thirds distance from proximal rim to summit of zooecium; pair of well-developed cardelles on lateral margins of aperture close to proximal rim. Sternal area represented by broad longitudinal median band extending from base to below proximal rim where it broadens to a tansversely oval area whose distal margin forms proximal rim of aperture. Scapular compartments, at level of distal half of apertures, occur on abzooecial side only, adzooecial side bearing a broad raised area; suprascapular compartments, separated by narrow band extending from distal rim of aperture to summit of zooecium, extend laterally round scapular compartments; distal infrascapular compartments, extending from scapular compartments

to base, bear six to eight septula. Dorsal surface, occupied by a proximal infrascapular compartment, bears seven to eleven scattered septula and is bounded by broad raised band. Ovicell large, globular, deeply immersed in distal zooecium and extending distally to proximal rim of distal zooecium.

Dimensions.—Internode of eight zooecia from Hamilton bore at 80-85 ft.: length 8.08 mm.; zooecium, length 0.43, width 0.24; aperture, diameter 0.09.

Distribution.—Lower Miocene: *vide* Maplestone (1904), and add: Batesford tunnel marl dump, Hamilton bore at 80-85 ft., No. 6 bore (Parish of Moorooduc) at 4-6 ft., No. 7 bore (Parish of Glencoe) at 650 ft. and 790 ft.

Observations.—An examination of about 50 internodes in the author's collection from various localities, has not revealed a single zooecium with a pore in the median frontal band as described by Waters (1881) who, however, also mentioned absence of pore in some specimens. Absence of transversely oval area below aperture in Macgillivray's figured specimen is due to fracture of this rarely-preserved salient portion. The author has observed no pore in this suboral oval area, but central portion of calcareous lamina is perceptibly thinner. The pore is probably present in young zooecia, but later becomes closed by secondary calcification.

Breadth of depressions varies considerably from the "long broad vitta near the outer border" of Waters (1883, p. 430) to the oval depression of the majority of specimens. Stages between these variations were obtained and it is suggested that Waters' var. *angustata* represents older internodes. Dorsal surface of primary zooecium of an internode has a median longitudinal band with narrow depression on each side, indicating the form which the zooecia would take when articulation proceeded further, and attained the type of zoarium found in Recent Catenicellidae.

Maplestone claims to have found forms agreeing with Waters' original description (1881), but the former author makes no mention of a pore in the median longitudinal band, which is found in Waters' description, but mentions presence of a pore in the oval transverse area, not noted by Waters. Distinguished from *D. continua* (Waters, 1891) by the far greater area occupied by depression on dorsal surface of zooecia.

Terminal Gonoecia.

Terminal gonoecia which have not been correlated with their zooecia are here listed. Maplestone described them under new trivial names of *Catenicella* and this practice is retained, "*Catenicella*" being used as the *sensu lato* genus of early authors (Stach, 1935, ii., p. 390), since their generic affinity cannot safely be established.

"CATENICELLA" MACGILLIVRAYI Maplestone, 1898.

Catenicella macgillivrayi Maplestone, 1898, p. 15, pl. i., fig. 2; *idem*, 1904, p. 187.

C. spenceri idem, 1898, p. 15, pl. i., fig. 3; *id.*, 1904, p. 188.

Observations.—Characterized by the two oval depressions directed downward above aperture, surmounting avicularium and six fenestrae of sternal area; probably referable to *Scuticella*. No essential difference between *C. macgillivrayi* and *C. spenceri* as described by Maplestone, both occurring only at Clifton Bank (Muddy Creek, Hamilton).

"CATENICELLA" NUTANS Maplestone, 1899.

Catenicella nutans Maplestone, 1899, p. 2, pl. i., fig. 2; *idem*, 1904, p. 187.

C. rotundata idem, 1899, p. 2, pl. i., fig. 4.

Observations.—Characterized by two lateral and one median depressions above aperture and by three or four fenestrae of sternal area. No essential distinction exists between *C. nutans* and *C. rotundata* as described by Maplestone, who later may have regarded them as conspecific, since he omits the latter name from his catalogue (1904). Both forms came from Balcombe Bay (Mornington).

"CATENICELLA" CONICA Maplestone, 1899.

Catenicella conica Maplestone, 1899, p. 2, pl. i., fig 3; *idem*, 1904, p. 186.

Observations.—Characterized by irregularly pitted area above aperture, surmounting avicularium and three fenestrae of sternal area. Recorded solely from Clifton Bank (Muddy Creek, Hamilton).

"CATENICELLA" PERSONATA Maplestone, 1899.

Catenicella personata Maplestone, 1899, p. 3, pl. i., fig. 5; *idem*, 1904, p. 188.

Strophipora dubia Maplestone, 1913, p. 356, pl. xxvii., fig. 4.

Observations.—Characterized by punctate area above aperture, surmounting avicularium and four fenestrae of sternal area. Maplestone's figured specimen of *C. personata* has the surmounting avicularium broken off, but this structure is well seen in "*Strophipora dubia*." Former specimen found at Balcombe Bay (Mornington), and latter in Geelong district.

"CATENICELLA" MINUTISSIMA Maplestone, 1911.

Catenicella minutissima Maplestone, 1911, p. 268, pl. xxxvii., fig. 7.

Observations.—Characterized by two lateral downwardly-directed depressions above aperture, small size, and numerous fenestrae of sternal area, which has a somewhat costate appearance probably placing it with *Costaticella* Maplestone. It resembles "*C.*" *macgillivrayi* Maplestone, but differs in its smaller size, and orientation of depressed areas above aperture.

"CATENICELLA" MAPLESTONEI nom. nov.

Catenicella elegantissima Maplestone, 1911 (*non C. elegantissima* Maplestone, 1898), p. 267, pl. xxxvii., fig. 6.

Observations.—Characterized by five fenestrae of sternal area and punctate "cap" at summit of gonoecium. *C. elegantissima* Maplestone, 1898, is referred, as previously stated, to *Carinatocella flexuosa* (Waters, 1881).

Forms Excluded from Catenicellidae.

LIRIOZOA LAEVIGATA (Waters, 1883).

Catenicella laevigata Waters, 1883, p. 432, pl. xii, fig. 1. Davis, 1934, p. 237 (footnote).

Liriozoa laevigata (Waters), Macgillivray, 1895, p. 6, pl iii., fig. 1. Maplestone, 1900, p. 162, pl. xvii., fig. 2; *idem*, 1904, p. 186.

Observations.—Macgillivray (1895) rightly placed this species with *Liriozoa* Lamarck as described by Levinsen (1909); it bears a striking resemblance to figures of *L. tulipifera* (Ell. and Sol.). The Victorian Tertiary species shows no distal spine arching over the aperture, though this may be due to fracture, and proximal region of triglobulus is more elongate than shown in Canu and Bassler's reproduction of Hincks' figure of *L. tulipifera* (1929, p. 436).

Davis (1934, p. 237, footnote) has stated that Canu and Bassler (1929, p. 395) placed *Catenicella laevigata* Waters, 1883, in *Tetraplaria* Tenison-Woods, 1878. The form indicated by Canu and Bassler is, however, "*Tetraplaria* (*Smittea*) *lacvigata* Waters, 1881," which doubtless refers to *Smittia centralis* var. *laevigata* Waters, 1881 (p. 337, pl. xiv., figs. 7, 8).

The generic name *Liriozoa* has been discarded by Davis (1934) in favour of *Pasythea* for *L. tulipifera*. No reason is given, but a personal communication from Davis indicates that the nomenclature of this and other forms will be discussed later. Meanwhile, the name *Liriozoa* is used.

MICROSTOMARIA TUBULIFERA Macgillivray, 1895.

Microstomaria tubulifera Macgillivray, 1895, p. 18, pl. ii., fig. 29. Maplestone, 1904, p. 190. Canu and Bassler, 1929, p. 452, text-figs. 185 D, E. Stach, 1934, ii., p. 44; *idem*, 1935, ii., p. 391.

Observations.—This form is referable to the cyclostomatous family Crisiidae, but its generic affinities are uncertain (Stach, 1935, ii.).

Family SAVIGNYELLIDAE Levinsen, 1909.

Genus **Chelidozoum** gen. nov.

Type: *C.* (*Claviporella*) *vespertilio* (Macgillivray, 1895).

Description.—Zoarium articulated; internodes of single zooecia only. Branching takes place by development of two zooecia articulated from summit of a single zooecium. Zooecium triangular, distal angles project backward and often support

avicularia. Aperture longitudinally oval with concave proximal rim and well-developed pair of cardelles.

Observations.—Placed with Savignyellidae because of inferred type of branching, division of aperture into poster and anter by a pair of cardelles, concave proximal rim, general outline and appearance of zooecia. In these characters this genus agrees with *Savignyella lafontii* (Audouin, 1826), the genotype of the type genus.

Distinguished from *Savignyella* Levinsen, 1909, by absence of suboral avicularium and presence of backwardly-directed processes at the distal angles, which usually support avicularia. Ovicelled specimens not found. The generic name is an allusion to the resemblance of the zooecia to the appearance of a swallow in flight.

CHELIDOZOUM VESPERTILIO (Macgillivray, 1895).

(Text-figs. 4, 5.)

Claviporella vespertilio Macgillivray, 1895, p. 20, pl. ii., fig. 22. Maplestone, 1904, p. 190.

Description.—Zooecium very elongate and triangular, proximal region tapering to fine narrow tube; greatest width, at level of avicularia, from two-thirds to half length. Concave proximal rim, in middle quarter of zooecium, at one-third distance from distal connecting-tube aperture to base; height of aperture about half distance from proximal rim to distal connecting-tube aperture. Aperture elongate-oval with salient distal rim and poster and anter, separated by well-developed pair of cardelles, are approximately equal in extent. Minutely and sparsely punctate frontal ornamented with numerous fine lirae radiating from vicinity of salient aperture. Distal angles extend obliquely backward as triangular processes, often bearing avicularia at their tips. Dorsal surface smooth, slightly concave and flattened between projecting distal angles.

Dimensions. — Zooecium from Forsyth's (Grange Burn, Hamilton) below remanié nodule bed: length 0.50 mm., width 0.43; aperture, diameter 0.07.

Distribution.—Lower Miocene: *vide* Maplestone (1904) and add: Forsyth's (Grange Burn, Hamilton) below remanié nodule bed, shore of Lake Gnotuk (near Camperdown).

Observations.—A series of exquisitely preserved zooecia from Forsyth's has revealed the above distinctive characters. The distinctive radiating liration of the frontal is only seen in well-preserved, nearly transparent specimens. Removed from Catenicellidae because of absence of lateral compartments, lack of frontal perforation and the mode of branching.

In the series of ten zooecia from Forsyth's examined and compared with Macgillivray's holotype, two showed a pair of

connecting-tube apertures at summit of zooecium, the remainder having only a single aperture. This feature, together with absence of geminate pairs referable to this form, indicates a mode of branching identical with that of *Savignyella lafontii* (Audouin, 1826).

The zooecia vary considerably in proportion of length to width, depending mainly on degree of development or abrasion of attenuated extremities of zooecia. Processes of distal angles may or may not develop avicularia; if not developed the process tapers to a fine point.

Incertae Sedis.

"Catenicella punctata" Macgillivray, 1895.

Catenicella punctata Macgillivray, 1895, p. 16, pl. ii., fig. 30.

Observations.—This represents a single zooecium detached from a bilaminate zoarium of one of the Adeonids. Heavy calcification has made many of its characters indistinct. Excluded from Catenicellidae since there is no evidence of lateral compartments or lateral avicularia. Maplestone probably thought likewise, since he omitted this form from his catalogue (1904).

"Claviporella sp." Chapman, 1913.

Astrorhiza angulosa Howchin (*non* Brady), 1886, pp. 160, 161.
Claviporella sp. Chapman, 1913, p. 184, pl. xviii., fig. 32; *idem*, 1916, p. 341, pl. lxv., fig. 32.

Observations.—Examination of the figured specimen and of additional specimens from No. 7 bore, Parish of Glencoe, at 580 ft. has shown that this form is not a bryozoan since (1) no aperture is present on either wall; (2) the perforations at the extremities of the angles are far too minute to represent an aperture for the protrusion of the polypide; (3) lack of ornamentation. These forms are hollow, flattened, triangular bodies formed of calcium carbonate, the angles being more or less elongated and perforated at their extremities; two of the angles often show greater attenuation than the third; breadth about 0.80 mm.

Extra-Australian Tertiary Catenicellidae.

The family Catenicellidae occurs in the Eocene and Oligocene of Europe and America, and is found from Oligocene to Recent times in the Australian region. The European and American forms are regarded as archaic members of Catenicellidae and all the species so far known have multizooecial internodes. Their systematics and distribution are summarized below.

Sub-family DITAXIPORINAE Stach, 1935.

Genus **Ditaxipora** Macgillivray, 1895.

DITAXIPORA CONTINUA (Waters, 1891).

Catenicella continua Waters, 1891, p. 6, pl. i., figs, 9, 10; *idem,* 1913,

Observations.—This is the only extra-Australian form referable to *Ditaxipora,* and it links the Victorian Tertiary forms, *Ditaxipora internodia* (Waters), and *Stenostomaria solida* (Waters), with the species placed below in *Ditaxiporina,* which occur solely in Europe and North America. Readily distinguished from *D. internodia* (Waters, 1881) by the far broader median longitudinal band on frontal, and small extent of depressed areas on dorsal surface.

Waters (1913, p. 485) referred this species to *Vittaticella* Maplestone, 1901, but this cannot be accepted, since, on the evidence of their distribution in time, and the developmental trends of the morphological features of this group, *Vittaticella* is of later origin than the Ditaxiporinae.

Distribution.—Lower Oligocene (Priabonian): Montecchio Maggiore, Brendola (Italy).

Genus **Ditaxiporina** Stach, 1935.

Ditaxiporina Stach, 1935, ii., pp. 391, 395.

Type (by original designation): *D.* (*Catenicella*) *septentrionalis* (Waters, 1891).

Observations.—Characterized by absence of median longitudinal band of *Ditaxipora* and by the fairly common occurrence of avicularia on both abzooecial and adzooecial sides of zooecia. Ovicell encroaches on at least half of distal zooecium.

DITAXIPORINA SEPTENTRIONALIS (Waters, 1891).

Catenicella septentrionalis Waters, 1891, p. 5, pl. i., figs. 1-8.

Observations.—Distinguished from others of this genus by greater proportionate length of zooecia. The single zooecia, and internodes of two, three and four zooecia, probably represent the first few zooecia in the development of a long internode.

Distribution.—Lower Oligocene (Priabonian): Montecchio Maggiore (Italy).

DITAXIPORINA LABIATA (Canu, 1910).

Bactridium labiatum Canu, 1910, p. 846, pl. xvi., figs. 7-8.
Ditaxipora labiata (Canu), 1913, p. 299.

Distribution.—Upper Eocene (Auversian); Biarritz.

DITAXIPORINA LUTECIANA (Canu, 1913).

Ditaxipora luteciana Canu, 1913, p. 298, pl. iv., figs. 9-10.

Distribution.—Middle Eocene (Lutetian): Bruges (Gironde, France).

DITAXIPORINA SUBSEPTENTRIONALIS (Canu and Bassler, 1920).

Catenicella subseptentrionalis Canu and Bassler, 1920, p. 550, pl. xcvi., fig. 11.

Distribution.—Oligocene (Vicksburgian): Salt Mountain (five miles south of Jackson) Alabama (U.S.A.).

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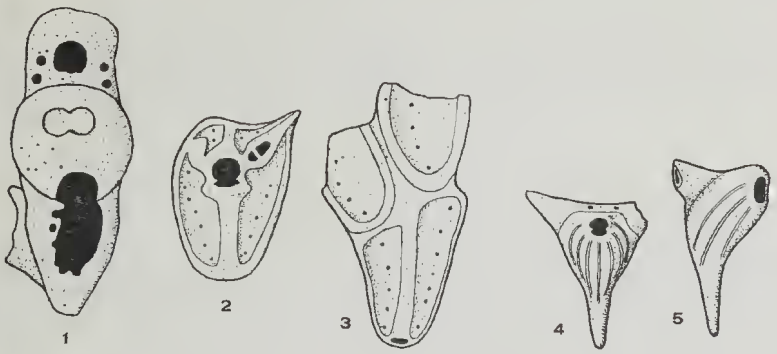

Figs. 1-5.

(Magnification × 45.)

Fig. 1. *Strongylopora tenuis* (Macgillivray). Triglobulus from No. 7 bore (Parish of Glencoe) at 790 feet, showing ovicell and proximal portion of the daughter zooecium. Nat. Mus. Coll.. No. 14042.

Fig. 2. *Ditaxipora internodia* (Waters). Outline of a single zooecium of an internode from Batesford tunnel marl dump, showing zooecial detail. Nat. Mus. Coll. No. 14043. Fig. 3. *Ditaxipora internodia* (Waters). Dorsal view of the first three zooecia of an internode from Hamilton bore at 80-85 feet, showing the median longitudinal band on the primary zooecium. Nat. Mus. Coll. No. 14044.

Fig. 4. *Chelidozoum vespertilio* (Macgillivray). Frontal view of zooecium from Forsyth's (Grange Burn, Hamilton), below remanié nodule bed. Nat Mus. Coll. No. 14045. Fig. 5. *Chelidozoum vespertilio* (Macgillivray). Side view of zooecium from same locality. Nat. Mus. Coll. No. 14046.